

REMARKS

Rejections under 35 USC §103(a)

Claims 1, 3 and 5 were rejected under 35 USC §103(a) as being obvious over Beilin et al. (U.S. Patent No. 5,916,453) in view of Albrecht et al. (U.S. Patent No. 4,968,585), and further in view of Ho et al. (U.S. Patent No. 5,354,712).

The examiner apparently associates the Beilin's elements 18 and 118 with the "posts" of claim 1. As admitted by the examiner, Beilin does not disclose that the structure is made by anisotropically etched silicon. This is clear in the disclosure of Beilin, column 5, line 53 and the subsequent lines, which reads "Once apertures 117 are formed, they may be filled with material to form post 118 as shown in FIG.15".

Albrecht describes as follows:

FIG. 3 shows the formation of a Si post 18 on the remaining surface of the wafer 10 formed by etching away several microns of Si 20 from the wafer's original surface 12. An anisotropic dry etch is used to obtain steep sidewalls on the post 18. The photoresist spot 16 and the remainder of the masking layer 14 improve the anisotropy of this etch. The depth of this etch should exceed the desired height of the conical tip which is to be formed.

(Albrecht, column 4, lines 16-24). It may appear that Albrecht discloses anisotropic silicon etching here. However, there is no reason to combine the etching of Albrecht with Beilin.

In Beilin, apertures are formed, which are then filled with material to form posts. Therefore, it is unnecessary for Beilin to etch silicon or the material that forms the posts because Beilin does not require anisotropical etching step.

As to the above-described point, the Examiner alleged as follows:

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a layer (16) of Beilin being made of silicon: thereby making post (11 or 118) the post being formed by anisotropically etched silicon, as taught by Albrecht et al. in order to achieve a fine pitch interconnection applied in a high density interconnection of a wiring board or a multilayer substrate by using silicon as a dielectric allowing much more precision than some of the other materials.

(Office Action, page 3, the second paragraph, emphasis added). As underlined above, the examiner apparently alleges that it is both obvious (1) to make layers 16 and 116 of Beilin with silicon, and (2) to form a post by anisotropically etching of silicon.

However, Beilin describes: “Photoresist layer 16 is then removed (stripped) . . .” (column 4, line 19), and it also describes: “Once apertures 117 are formed, Thereafter, photosensitive layer 116 is removed” (column 6, line 57). Thus, because layers 16, 116 are removed, no silicon post will remain in Beilin even if layers 16, 116 are replaced by silicon.

In addition, the posts 18, 118 of Beilin are formed by the material, filled in the apertures 117. Before that, the apertures 117 are formed in the layers 16, 116. Accordingly, even if the layers 16, 116 are made of silicon, posts 18, 118 will not be made of silicon because a portion of silicon is removed to form the apertures.

Therefore, the Office Action erroneously associates the “silicon posts” in the present claim 1 with layers 16 and 116 of Beilin.

The Examiner further alleged as follows:

Beilin and Albrecht do not specifically disclose a side-face of the post being covered by an electrically conductive film so as to provide electrical contact between said one side and other side of the substrate.

Ho shows an interconnection structure as shown in figures 1a-1c comprising a side face of an interconnection (31) being covered by an electrically conductive film (22) so as to provide electrical contact between said one side and other side of a substrate (18).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a side face of a post being covered by an electrically conductive film as taught by Ho employed in the substrate of Beilin and Albrecht in order to provide a protection barrier side surfaces for the post.

However, in Ho, although something like a post is formed by filling a material in an aperture as shown in FIG. 1, Ho does not teach or suggest formation of the post by etching the material. Therefore, there is no reason in the prior art to combine Beilin, Albrecht and Ho.

For at least these reasons, claim 1 patentably distinguishes over Beilin, Albrecht and Ho. Claims 3 and 5, both depending from claim 1, also patentably distinguish over Beilin, Albrecht and Ho for at least the same reasons.

Thus, the rejection under 35 USC §103(a) should be withdrawn.

Claims 4 and 6 were rejected under 35 USC §103(a) as being obvious over Beilin et al. (U.S. Patent No. 5,916,453) in view of Albrecht et al. (U.S. Patent No. 4,968,585), and further in view of Onishi et al. (U.S. Patent No. 5,459,368).

Claims 4 and 6 both depend from claim 1, which patentably distinguish over Beilin and Albrecht et al as discussed above. Therefore, claims 4 and 6 also patentably distinguish over these references for at least the same reasons.

Ohnishi et al is cited for allegedly disclosing an electronic device mounted on a pad of a substrate. Such disclosure, however, does not remedy the deficiencies of Beilin, Albrecht.

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Art Unit: 2841

Amendment under 37 C.F.R. §1.111
Attorney Docket No.: 010153

For at least these reasons, claim 4 and 6 patentably distinguish over Beilin, Albrecht and Ohnishi.

Thus, the rejection under 35 USC §103(a) should be withdrawn.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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